

ANALYSING OF SECTOR SPECIFICITY REGARDING ICT AND BROADBAND USAGE BY SMME BUSINESSES

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ABSTRACT: In the transition of the techno-economic paradigm from a (post) industrial to an information society, it is crucial that ICT and broadband become embedded within the whole of the socio-economic system. However figures show that SMEs and micro-enterprises – the backbone of European economy – are still lagging behind, despite the numerous policy initiatives. In this paper we focus on the specificity of the sector for understanding ICT usage in small business, instead of the common generic SMME approach. In February 2006 a survey was done with 966 Belgian enterprises that answered an online questionnaire. The goal was to better understand how professional activity is linked with ICT usage. The latter was measured by means of four compound indicators (adoption, usage, knowledge and attitude). The three sectors with the lowest degree of ICT usage were identified: construction, retail trade and manufacturing. Within these sectors a thorough study was done by means of interviews with professional organisations and focus group interviews with a carefully selected sample of SMME business owners. This resulted in the identification of sector-specific elements as well as issues that transgress different sectors. These findings are to be integrated in a public initiative by the Federal Ministry of Economy for stimulating ICT usage among Belgian SMMEs.

INTRODUCTION

In the transition of the techno-economic paradigm from a (post) industrial to an information society, it is crucial that ICT and broadband become embedded within the whole of the socio-economic system. These technologies and applications have substantial potential for changing business performance. A differentiation is made between ICT in the primary process versus ICT in the secondary process. The primary process refers to basic automatisisation of the production process, where machinery is more and more linked with computer technology. The secondary process is the support system on an administrative and office level, where ICT is being introduced on the level of transactions (eg e-commerce, Customer Relationship Management), knowledge (eg sector-specific software, business intelligence, communities of practice), and management (eg accounting software, e-HRM, balanced scorecard). However these two levels are increasingly coupled with systems like Enterprise Resource Planning (ERP) and Supply Chain Management. In our study we focus on the secondary process, with a link to ICT at primary level.

This raises the question of the extent to which enterprises have embraced ICT. In general most European companies have adopted ICT (European Commission, 2006; DTI, 2004). However an additional effort is still needed for the SMMEs, representing 99.7% of all enterprises, thus the backbone of the European economy

(European Commission, 2003). Earlier research has shown that many SMMEs lag behind in the usage of ICTs at the secondary level in comparison to the larger enterprises (European Commission, 2006; DTI, 2004; Eurostat, 2002). And in particular the micro-enterprises (SMEs with less than 10 employees) are on the wrong side of the digital divide (Arbore & Ordanini, 2006). Therefore public and private institutions are stressing the importance of SMME-oriented R&D policies and innovation strategies (eg EU i2010 strategy – Competitiveness and Innovation Programme).

To fill in the notion of “SMME-oriented”, we need to define SMMEs and to identify the characteristics that help to explain the obstacles for ICT to be embedded in small businesses. An SMME is defined very differently depending on the country, the kind of research and/or the organisation doing the research. According to European regulation an SMME is a company with less than 250 employees.¹ However in our study we use the common Belgian definition, ie less than 50 employees.

The majority of research concerning ICT implementation in small businesses, starts from a generic approach and thereby underexposes the significant differences between companies. Firstly, these studies often concentrate on medium-sized and large businesses. Up-to-date figures on ICT in small enterprises are less common. Secondly, in contrast to large companies, the behaviour of small companies’ business owners is not only determined by economic motives, but also by social ones. Previous studies often ignore those socio-professional factors on a micro-level that influence an entrepreneur’s ICT decisions (Pierson, 2005). Finally, whilst these aspects may have significant influence on ICT usage, former research often pays little or no attention to the diversity of sectors and the types of professional activities. The few studies that have been done in this regard, demonstrate that the specific sector is as significant or possibly even more significant than its size (Barrett & Rainnie, 2005; Pierson, 2003). This forms the basis of our study on Belgian small businesses. In this paper we focus on the extent to which the specificity of the sector helps us to understand ICT and broadband usage by SMMEs.

Under the authority of the Belgian Ministry of Economy² we investigate an optimal approach for stimulating ICT appropriation by small firms based on sector

¹ On 06 May 2003 the Commission adopted Recommendation 2003/361/EC which defines SMEs on the basis of the number of employees (less than 250), then annual turnover (not exceeding €50 million) or balance sheet (not exceeding €43 million), and finally economic independence. However the non-personnel criteria are hard to cover in aggregate statistics and therefore not taken into account in this study.

² This study was done under the authority of the Belgian Ministry of Economy between November 2005-2006.

specificity. The research consisted of three main phases, of which only the first two are discussed in this paper:

- identification of sectors that lag behind with regard to ICT;
- in-depth investigation of sectors with regard to ICT;
- input for a targeted incentives campaign.

These research phases were operationalised by way of a multi-methodological research approach. First a general overview was compiled of existing resources and findings with regard to sector specific adoption and use of ICT, which was complemented by 19 interviews with “horizontal” organisations and bodies that represent SMMEs.

Next an online survey was sent out to 5 000 Belgian enterprises. Research on online questionnaires has demonstrated that the personalisation of emails positively influences the response rate of online surveys (Best & Krueger, 2004). We therefore purchased a set of personal email addresses of Belgian business owners. At the time of research there were 928 596 SMMEs in Belgium. It must be noted that at that time none of the data supply companies possessed a complete database, which meant that not every Belgian SMME was represented in the sample. In addition, an “online” survey does exclude companies not yet connected to the Internet, and therefore cannot be seen as representative of all Belgian SMMEs. This was nevertheless a deliberate strategy, as most recent studies demonstrate that SMMEs currently face more difficulties in ICT usage than in ICT take-up (Eurostat³). As the Information Society Report of the European Commission states: “Connectivity has grown significantly over the past three years with real signs of catch-up by SMEs. ... There is no evidence of growth in the use of ICT.” (European Union, 2006) Therefore the focus of the research was not on ICT take-up, but on the opportunities of ICT usage.

From the 5 000 mails we sent out, 608 bounced back. Hence, 4 392 business owners received an email request to complete the survey. 1 220 respondents completed the questionnaire, of which 254 appeared to have an incorrect profile. A total of 966 useful surveys remained, leading to a response rate of 28%.

This survey had two main objectives: to map ICT usage in Belgian SMMEs and to identify the sectors that lag behind with regard to ICT usage. Based on the results of

³ Eurostat. Percentage of enterprises having access to the Internet.
http://epp.eurostat.ec.europa.eu/extraction/retrieve/en/theme4/infosoc/policy/polind_b/polindb2?OutputDir=EJOutputDir_3083&user=unknown&clientsessionid=11BFB8680947FA91449523987E05CEE3&extraction-worker-2&OutputFile=polindb2.htm&OutputMode=U&NumberOfCells=6&Language=en&OutputMime=text%2Fhtml&.2005

the survey we identified those sectors lagging behind in ICT innovation in their business processes. This enabled the contextual mapping of SMMEs in three different sectors: construction, retail trade and manufacturing. Within these sectors we interviewed 13 “vertical” professional organisations to collect sector-specific views on Internet and broadband. Finally the outcomes of these research phases were discussed with business owners from the respective sectors in a series of 11 in-depth focus group interviews. Initially the composition of the focus groups was aimed at representing as many as possible sub-sectors of the selected sectors. For pragmatic reasons (business owners are extremely busy) this strategy was not always able to be implemented. The invitation of business owners to a focus-group interview was done by phone and email. Initially, business owners were chosen randomly from a phonebook. Subsequently, the professional organisations provided contact details for the SMMEs.

This paper clarifies the sector-specific constraints for ICT usage, the way to overcome these constraints and the perceived opportunities as identified by all the players. The findings of this research have been incorporated into a public initiative for stimulating ICT usage among Belgian SMMEs.

FRAMEWORK FOR ASSESSING ICT USAGE IN SECTORS

To identify the sectors that lag behind with regard to ICT, we developed an analytical framework for assessing the ICT usage at sector level, based on an online survey. First the companies being questioned were divided into seven key sectors: construction, wholesale trade, retail trade, personal services, manufacturing, transport & communication, and professional services. This breakdown was based on earlier SMME research (European Commission, 2003). The ICT usage in the different sectors was measured using four compound indicators: adoption, usage, knowledge and attitude. These are equivalent to the different areas for measuring the digital divide (Van Dijk, 2005).

A compound indicator is an “umbrella concept”, which consists of different parameters being measured by specific questions in the survey. This way the general variable “knowledge”, for instance, embeds different measurable parameters, like perceived knowledge and the understanding of different ICT applications. When processing the raw data, various parameters have been eliminated for being too sector specific (GPS in combination with the transport and communication sector), too widespread (mobile phone), or having too low response rates (due to sector division and multiple response possibilities). The remaining 43 parameters were

linked again to the four compound indicators.⁴ Per compound indicator, each sector received a ranking number for each parameter, depending on the results of the other sectors. The sector with the highest results scored one, while the sector with the lowest results scored seven. Finally these scores were added up per sector. That way the sector that lagged behind the most, received the highest total. In order to compare the different sectors in a transparent manner, the results on the compound indicators were displayed on three graphs, where the vertical axis represents “usage” and the horizontal axis represents the remaining indicators (see Figures 4, 5 and 6 in this paper).

FINDINGS

Firstly we provide an overview of the current ICT situation of Belgian SMMEs. Then we look at an assessment of ICT usage in the different sectors using the four compound indicators: adoption, usage, knowledge and attitude.

MAPPING SMMEs AND ICT USAGE IN BELGIUM

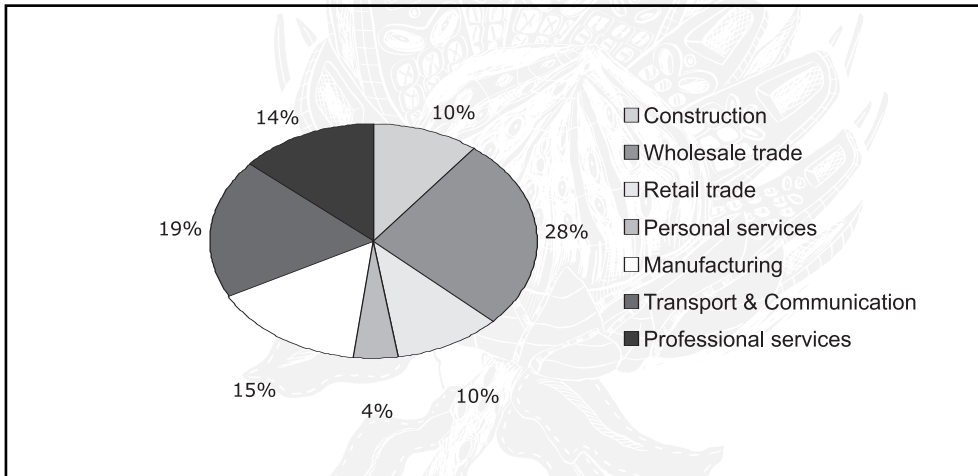
Of all the people that answered the questionnaire, 92% are business owners. The remaining 8% of respondents is made up of managers (2%), directors (2%), administrative staff (2%), IT staff (1%) and an assistant (1%).

The majority of the respondents that answered the survey are Dutch speaking (74%), male (88%) and 35 years or older (91%). Seven out of 10 participants hold a graduate or university degree. More than three out of five firms questioned (64%) are business-to-business oriented (29%), involved in both business-to-business and business-to-consumer. Only 7% supply end-users. Most companies label the current economic situation as average (45%) to good (43%). Furthermore, two out of five companies questioned will expand their staffing in the next six months. These figures indicate a rather positive economic environment. The average number of employees in our sample is 19. This means that the average SMME in our sample is rather large in comparison with the average European SMME, which has five employees (European Commission, 2003).

The graph illustrates the sector division in our sample.

4 Parameters of the four compound indicators: Adoption (eg having PDA, number of computers per employee, internal network, broadband); Use (eg texting, MMS, Internet, e-invoice); Knowledge (eg EDI, smartphone, Blackberry, Internet); Attitude (eg inclined to use e-invoice in the future, actively looking for ICT information in IT magazines, additional IT training, degree that business owner is interested in e-business).

FIGURE 1: SMME SECTOR DIVISION

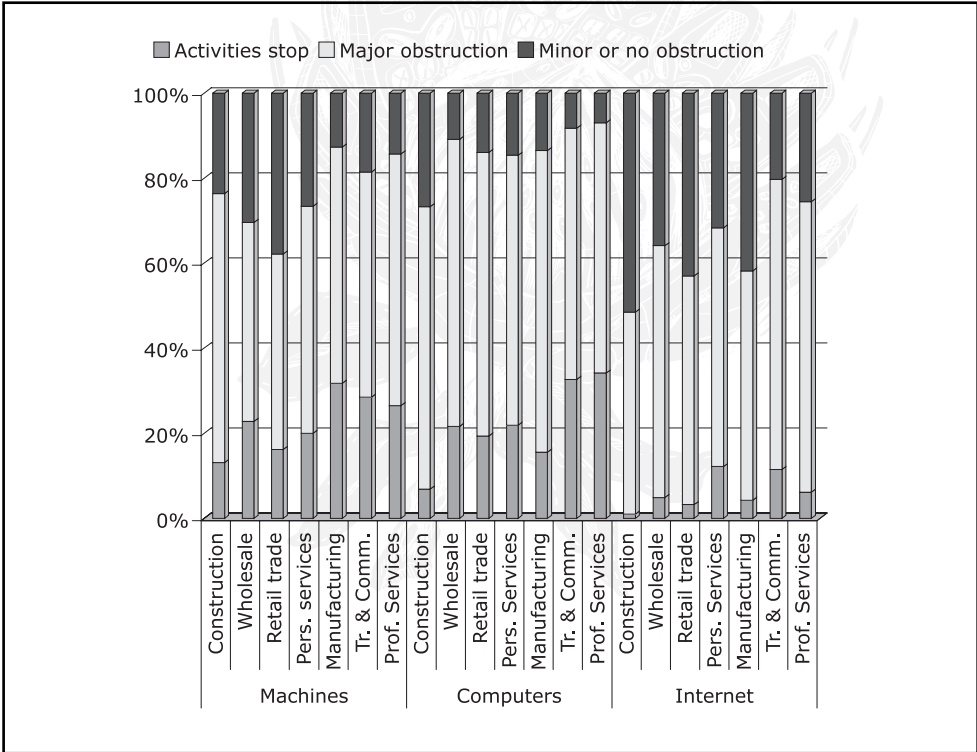


In comparison with the overall Belgian SMME population, the sectors of wholesale trade, and transport & communication, are somewhat over-represented, whereas the construction sector is somewhat under-represented in comparison..

In general the firms that answered our survey are well equipped with ICT. Facsimile and mobile phones have a penetration rate of 99%, more than 60% of business owners have a PDA and almost half the companies have EDI. 89% of the companies with Internet access have a broadband connection and 83% of the enterprises have a website. In the area of security, most companies also score reasonably well, with 96% of enterprises having anti-virus software, 83% firewall software and 72% anti-spam software. On a less positive note however, more than one out of five firms (21%) does not make systematic back-ups of their computer data.

With regard to ICT usage, the Internet-connected SMMEs that answered the survey score less. Around 12% of entrepreneurs with Internet access do not use the Internet daily. When comparing the impact of failure on robotics, computers and Internet, it is clear that Internet is not yet critical for most of the companies. This could indicate that the Internet is not really integrated into the critical business processes.

FIGURE 2: CRITICAL NATURE ICT



The most common activity on the Internet is the search for information. Online banking (93%), ISABEL⁵ (82%) and DIMONA⁶ (61%) are applications that are frequently used as well. In contrast, only one third of the SMMEs interviewed use the following applications: Tax-on-Web⁷, DmfA⁸ and VoIP⁹.

5 ISABEL = Integrated Software Solution for Online Payments and e-Invoices.

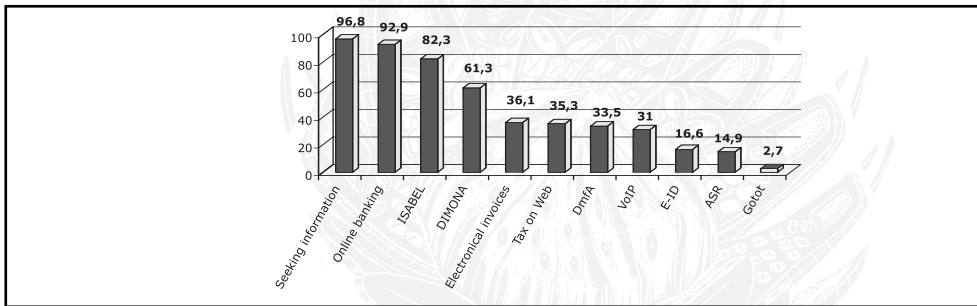
6 DIMONA = Déclaration IMMédiate – ONmiddellijke Aangifte; Electronic system for social security administration. DIMONA can be used to report the start or termination of employ to the National Office for Social Security.

7 Tax-on-web = Tax declaration via Internet.

8 DmfA = Déclaration Multifonctionnelle – Multifunctionele Aangifte; Electronic system for the declaration of data concerning employees' salaries and working hours.

9 VoIP = Voice over Internet Protocol, eg Skype.

FIGURE 3: USE OF INTERNET



Around eight out of ten SMMEs (83%) have a website. Only 19% of these respondents update their company's website regularly or on a daily basis. This indicates that most business owners view their website as a static communication tool. The main information source for SMMEs regarding ICT issues is the ICT supplier (63%). SMMEs' customers have the strongest influence on the degree of ICT usage (38%), with ICT suppliers being second in line (24%). The government and professional organisations appear to play only a minimal role as an information channel and driving force for ICT usage.

These overall findings correspond to the results of the latest 'e-Business W@tch Survey 2006' (European Commission, 2006) – one of the few large-scale studies with a sectoral approach with regard to ICT. Even though this European e-business study sometimes has different points of departure, similar results can be observed. The study clearly shows for example that large firms are leading the way with ICT adoption and that SMEs and micro-enterprises are falling far behind. Furthermore the study demonstrates obvious sector-specific differences concerning ICT adoption. As in our study, the construction sector is lagging behind on various parameters. According to the e-Business W@tch study, only 27% of construction companies use e-invoices, whilst 64% of hospitals already integrate this application into their daily management. These numbers correspond to a large extent to our results (27% – SMMEs in construction and 63% – SMMEs in personal services).

IDENTIFICATION OF THE SECTORS WITH LOW ICT USAGE

A second objective of this study was to identify the three sectors with the lowest degree of ICT adoption. For this we developed a research framework that would measure the compound indicators – adoption, usage, knowledge and attitude. Based on these indicators, sectors could be compared and ranked according to their scores. The analysis demonstrates that the sectors differ substantially on these four different levels of ICT adoption. First let's look at the sector differences that make

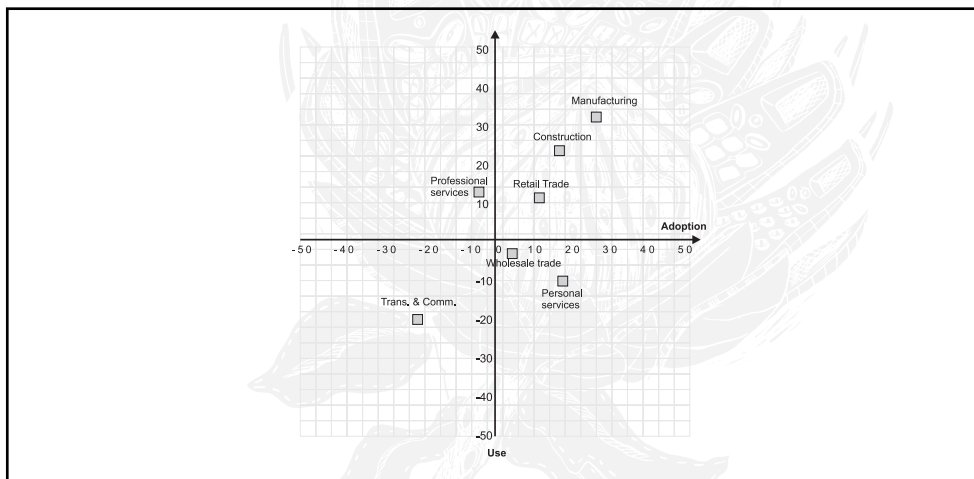
up the compound indicators. This leads to the overall classification of the sectors, which enables the identification of those sectors that lag behind with regard to ICT. In order to see the differences in ICT adoption, the figures are plotted on three graphs. Given that our focus in the study is on understanding ICT usage, this is taken as the fixed vertical axis. The horizontal axes are ICT adoption, ICT knowledge and ICT attitude respectively. To interpret the graphs correctly, it is important to realise that the higher and the more to the right the sectors are positioned, the more they lag behind with regard to ICT adoption – the upper right quadrant indicates the sectors that need the most urgent attention.

With regard to the first compound indicator “ICT usage” we find that the transport and communication sector, closely followed by the personal service SMMEs, are the ones that use ICT the most. More than nine out of 10 business owners in transport and communication are heavy Internet users – daily usage of the Internet (92%) and receive more than 10 e-mails per day (92%). The personal service companies score best with regard to the use of electronic invoicing (63%). This is high in comparison with the construction companies (27%). However the latter use SMS (texting) the most (98%), while manufacturing companies have the lowest rate of SMS usage (92%). In general the manufacturing sector lags behind in ICT usage in the following areas: daily Internet (82%), Tax-on-web (29%) and updating the company website at least once a month (26%).

Concerning the compound indicator, “ICT adoption”, the figures show that the personal services respondents have the lowest number of broadband connections (88%) compared with the construction sector where 95% of the enterprises are connected via broadband. Yet the latter have the lowest website presence (74%). Having a website is the only parameter for which the manufacturing sector scores the highest (89%). On all other parameters this sector is performing poorly, which leads to the lowest position in this compound indicator. This is related to the low adoption of devices like PDA (47%) and smartphones (10%), but also to the lowest ranking concerning security software like fire-walls (77%) and anti-spam measures (64%). The most alarming figure is that 30% of the manufacturing companies do not have a systematic back-up system. To show the position of the different sectors we have plotted the ICT adoption and ICT usage on a graph (Figure 4). This highlights the critical position of the manufacturing sector, both for adoption and ICT usage.¹⁰

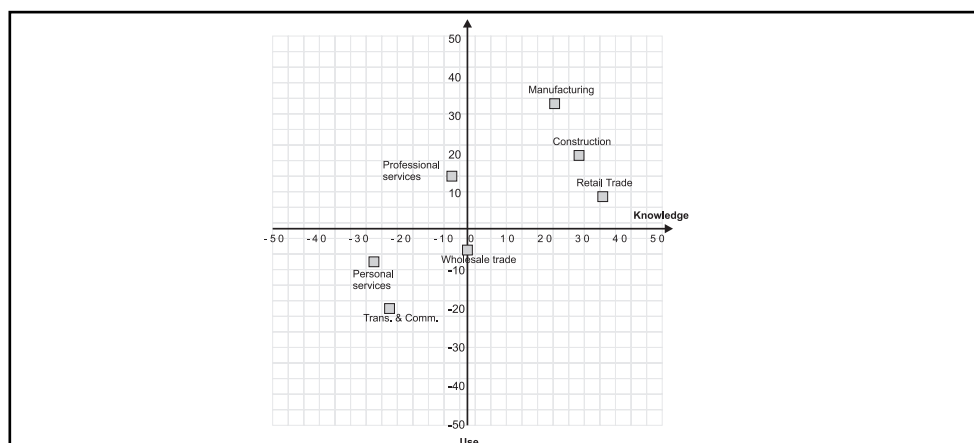
10 Higher up on the scale or to the right indicates a more urgent situation for action. This is due to the ranking number that is higher in absolute terms (eg seventh in row equals seven as an absolute score, which is added to the ranking number on the other parameters in the respective compound indicators).

FIGURE 4: ICT ADOPTION VS ICT USAGE



The compound indicator “ICT knowledge” shows that the shortage in ICT knowledge is most visible in the retail trade sector. The respondents from this sector have the lowest position on three-quarters of the parameters, due to ignorance of the most recent technologies and devices (eg smartphones). Furthermore 30% of the retail traders admit to very little knowledge of the Internet. By intersecting the knowledge and usage indicators we end up with a graph (Figure 5) where the retail trade is located on the far right.

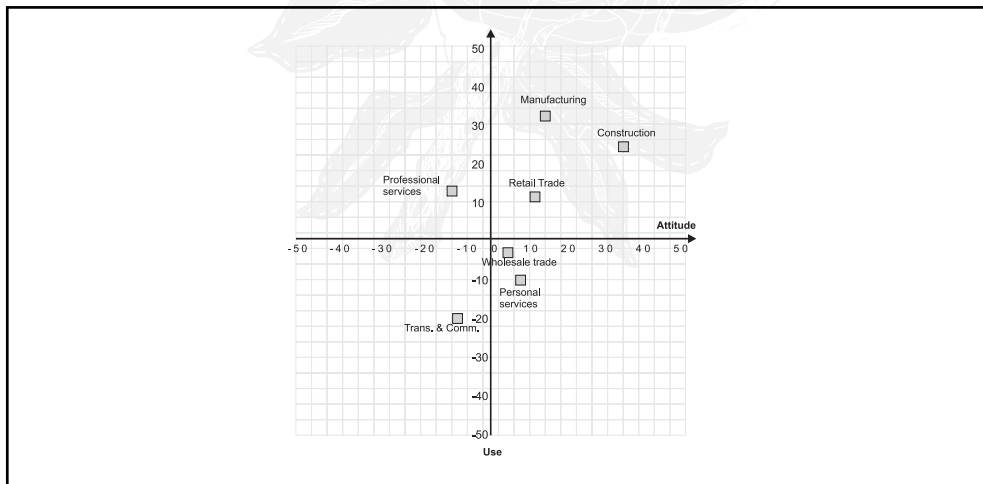
FIGURE 5: ICT KNOWLEDGE VS ICT USAGE



The results on the last compound indicator “ICT attitude”, show that entrepreneurs in the construction sector have the least interest in ICT, while business owners from the professional services and transport & communication have the most interest in ICT,

displaying a positive attitude. For example three out of four respondents (76%) from the transport & communication sector that currently do not use e-invoicing would be interested in using this application. In the construction sector, this is only 49%. For VoIP the figures are similar, 74% and 47% respectively. The construction SMMEs also have the smallest percentage of business owners who have taken additional ICT courses (32%). Intersection of attitude with usage results in the following graph below (Figure 6). Here the construction sector is located in the upper right quadrant.

FIGURE 6: ICT ATTITUDE VS ICT USAGE



The analysis based on the four compound indicators shows that the transport & communication sector takes the lead in ICT usage in Belgium. This is not really surprising given that SMMEs in the IT business are part of this sector. However the goal was to identify those sectors that lag behind. Here we find that a differentiation should be made between the various indicators. We find that the manufacturing sector is at the bottom with regard to ICT adoption and ICT usage. The retail sector fairs the worst with regard to ICT knowledge, while the construction sector needs the most attention with regard to ICT attitude. The latter three sectors were therefore investigated more thoroughly in the next phase of the research project. This was done by interviewing the relevant professional organisations and by conducting several in-depth focus group interviews with a carefully selected sample of business owners in these sectors.

The key issues that determine the manufacturing, retail and construction sector-specific adoption of ICT, were first investigated by interviews with their professional organisations. For each sector the most representative organisations at a regional level were selected (Flemish and Walloon region) and at a federal level (Belgium). Besides the sector-specific federations, this also included interviews with some general SMME associations, given their close link with the respective sectors.¹¹

The professional organisations interviewed in the construction sector have a rather clear overview of their sector.¹² Belgian construction companies are often relatively small and informal family businesses (less than 10 employees), for the moment characterised by a rejuvenation trend, where the average age of business owners in the construction sector is lower. Construction firms operate primarily on a local level and hence experience a lot of local competition. The construction sector is in fact a vertical value chain, ie all the players involved in the building process, from architect¹³ to painter, belong to the same sector and each of them add value to the creation of the final product (house or other building). According to the professional organisations the differences between sub-sectors concerning the ICT indicators are substantial: the architects and industrial engineers are most often the ICT pioneers; the carpenters, infrastructure workers and installation specialists are average performers; while the basic construction companies fall somewhat behind. The professional organisations believe that the main reasons for poor ICT adoption is related to the products a company or entrepreneur deals with (for instance electronic heating versus bricks) and to the educational level of business owners, which often correlates with their professional activity. Professional organisations suggest that actions for stimulating ICT adoption should be aimed at contractors, as they are the link between all other sub-sectors and therefore can be seen as catalysts.

11 The general SME associations are: Unizo (Unie van Zelfstandige Ondernemers – Organisation for the Self-Employed and SMEs) and UCM (Union des Classes Moyennes).

12 The following professional organisations from the construction sector were interviewed: Bouwunie (Union of SME-construction), CCW (Confédération Construction Wallonne) and WTCB-BBRI (Belgian Building Research Institute).

13 According to NACE, the official statistical classification of economic activities in the European Community, architects are classified as: 74 other business activities under the K tabulation- real estate, renting and business activities; ie they are not part of the construction sector. However, from a value network perspective, architects can be seen as a part of the vertical value chain of the construction sector. In this study we therefore decided to include architects as a branch of the construction sector.

Manufacturing companies are on average larger and often more formal companies than construction companies.¹⁴ They operate on local, regional and international levels, and therefore experience more international competition. In contrast to the construction sector, the manufacturing companies are situated at one position in the vertical value chain. Suppliers and customers of these companies operate at other positions in this value chain (eg production of raw materials, retail trade). The professional organisations believe that the main reason for these companies lagging behind in ICT is the lack of critical mass, money and time, as well as the lack of standardisation and compatibility of IT programmes.

Finally the retail trade is an extremely diverse sector, which makes it very difficult to determine general and common characteristics.¹⁵ However the professional organisations indicate that most of the retail companies in Belgium operate on a local level (although regional businesses are no exception) and experience severe competition. Other retail businesses are most often seen as competitors and less as colleagues for exchanging information and experiences. Similar to the manufacturing sector, retail traders operate as a link in the vertical value chain. Due to the diversity of the sub-sectors, it is hard to identify pioneers and laggards with regard to ICT. However, common to all retail traders is the importance of personal contact with consumers. In this context, e-business is not always seen as positive given the potential loss of human contact.

It is clear that each sector has its own specific characteristics that influence the ICT uptake in a positive or negative way. Factors like orientation of business activities (local, regional, international), educational level of business owners, socio-professional context, position and cooperation in the value chain, activities, products and specific relationships with customers determine the specificity of each sector.

BOTTLENECKS AND OPPORTUNITIES

To supplement the view of the professional organisations, we also interviewed the business owners by way of focus groups. Besides the validation of the sector-

14 The following professional organisations from the manufacturing sector were interviewed: Agoria (Federation for the technology industry), AWT (Agence Wallonne des Télécommunications), Febelhout (Belgian woodworking and furniture industry) and WTCM-CRIF (Knowledge centre for the technology industry in Belgium).

15 The following professional organisations from the retail sector were interviewed: Fedis (Belgian federation of retail trade), Febeltex (Professional textile federation) and IFP (Initiative de formation professionnelle de l'industrie alimentaire).

specific issues indicated by the sector organisations, we also find some common bottlenecks and opportunities concerning ICT intensity that transverse the different sectors. We have presented the main issues based on this analysis.

Even though computers have become indispensable in daily business management, almost all business owners have difficulties in finding the appropriate IT programmes, adapted to their specific professional activities. In addition many enterprises still work with an outdated ICT infrastructure. The implementation of up-to-date equipment is often being postponed by the high costs involved and the (possible) loss of time to implement the technologies.

Although email and Internet are gaining importance as primary communication channels, several business owners, mostly from the construction sector, still have a problem with trust issues regarding these media. One of the reasons is the problem of sending digital plans through email.

For many business owners websites often do not offer any real “added value”. They are considered as a display window or sometimes even as a “necessary evil”. They are not seen potentially as a strategic marketing tool or a means for selling more products and/or services. This also explains the limited frequency of website updating. Even businesses that have direct contact with consumers (eg retail trade) do not immediately perceive the added value of a website. The same goes for companies that are involved in business-to-business. The retail entrepreneurs see the lack of physical contact with the clients as a major obstacle.

Furthermore, a lack of critical mass amongst customers, suppliers and partners, is identified as an important bottleneck: business owners are less inclined to use ICT due to the limited ICT usage of their direct business partners. This stresses the importance of taking a *meso* approach with the issue of stimulating ICT usage in different sectors. This means that partners at different positions in the value chain need to be involved simultaneously regarding ICT innovation, especially in business-to-business relationships. The goal is to make the transactions more efficient for the business owner.

Further, a lack of knowledge and information about ICT, a lack of money and time, and a lack of programme compatibility seem to be important bottlenecks that hinder investment in ICT. There is also a general concern re “lock in”. Because many entrepreneurs feel insecure about their knowledge of the ICT market, they are afraid to invest in infrastructure that could be outdated or incompatible with other ICT investment in the short or long term. They often do not have the funds to invest in

another ICT system if their first choice is not optimal. Therefore small companies are often unable to switch from one technology to another, as a result of which business owners feel locked into a certain technology. In this sense dependency with regard to their ICT suppliers frustrates small businesses. This problem could be solved by jointly collecting information about the supply and the quality of the technologies and applications for each sub-sector individually.

Finally we detected bottlenecks that are not directly related to ICT, but nevertheless have a significant influence on ICT usage. This refers to the importance of the social context (eg children with computer expertise) and to the influence of private contacts for advice on ICT matters (eg friend-colleague with experience in a certain type of software programme) in comparison to a (possibly biased) sales person or an impersonal helpdesk. The business owners also pointed at the lack of standardisation in coding techniques of article numbers and article structures. Because everyone handles different techniques and numbers, it is hard to formalise and digitise these mechanisms. This could be solved by a joint action of the respective professional organisations in co-operation with the public authorities.

CONCLUSION

To identify the sectors that lag behind with regard to ICT, a quantitative analysis of the ICT usage among SMMEs was performed, based on four compound indicators: adoption, usage, knowledge and attitude. This analysis confirmed major differences between the professional sectors on different levels. These results indicate that the integration of ICT in the daily business management happens at a different pace in each of the sectors. In addition we found that the bottlenecks constraining the implementation as well as the usage of ICT in the SMME business processes are sometimes both sector and non-sector specific. Non-sector specific are for example lack of time, knowledge, money, standards, compatibility, appropriate supply of programmes, critical mass and awareness. These constraints are common for all of the three sectors investigated.

The research not only identifies these general bottlenecks, but also shows that the level of these constraints, the impact of them on the industry and moreover the way to deal with these constraints have to be radically sector specific. This has to do with the specific organisation of each industry based on their activities. However the findings show that these sectors have fairly diverse characteristics and operate under quite different circumstances. For example when furthering

ICT usage in retail trade, one should take into account the importance of personal contact. Hence, it might be more reasonable to focus stimulation activities on back office IT and less on introducing e-business with customers. Even when facing non-sector specific bottlenecks, it is essential to apply sector specific solutions. Standardisation in article numbers for instance, should be dealt with completely differently in the manufacturing sector from the construction sector. Since manufacturing companies mostly operate and compete on a European or international level, this problem should be solved on an international level. However, for construction companies, this issue could be solved on a national level.

When setting up SMME-oriented policies and innovation strategies, public and private institutes should take into account the different impact of the identified constraints between sectors. Even solutions and strategies to overcome common bottlenecks should be translated to the dimensions inherent in the specific sector. It would even be more advisable to focus on specific sub-sectors instead of sectors in general. Take the construction sector as an example, it is clear that architects and industrial engineers require a different approach and solution, compared to painters and bricklayers. In this respect however, further research is required. This will be part of a follow-up research project in Flanders (Belgium).

The results from this Western study are also relevant for African policy makers. The performance of SMMEs using ICT is essential for African economies, possibly even more then for European economic systems. In Africa the micro-enterprise activities are an important part of the non-observed economy, in particular the omnipresent informal economy (OECD, 2002). In addition although the evidence is not conclusive, research indicates high rates of information systems and ICT failure in developing countries (Heeks, 2002: 103). The poor access to and high cost of ICTs, particularly broadband, also constrain the uptake of ICTs by SMMEs, which are currently almost exclusively dependent on the limited functionality of mobile phones (Esselaar and Stork, 2006). In this way industry-specific SMME research on ICT implementation can help in better supporting policy making with regard to this vital part of the African economy. With that the article can also be involved in international comparative research on SMMEs and ICT usage. □



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REFERENCES

- Arbore, A. & Ordanini, A. (2006) "Broadband divide among SMEs", in *International Small Business Journal*, 24 (1), 83-99.
- Best, S.J. & Krueger, B.S. (2004) *Internet Data Collection*. London, Sage, 91.
- Dijk, J. A. G. M. v. (2005) *The deepening divide: inequality in the information society*. Thousand Oaks, Calif.; London: Sage, 240.
- DTI. (2004) *Business in the information age: the international benchmarking study 2004*. London: Department of Trade and Industry.
- Esselaar, S. and Stork, C. (eds) (2006) *Towards an African e-Index SME Access and Usage Research ICT Africa!*
(<http://www.researchICTAfrica.net>)
- European Commission. (2006) *A pocketbook of e-business indicators: a portrait of e-business in 10 sectors of the EU economy (e-business w@tch)*. Luxembourg: DG Enterprise, 79.
- European Union. (2006) *Information Society Benchmarking Report*. Brussels: European Commission, 30.
(http://europa.eu.int/information_society/europe/2010/docs/benchmarking/051222%20Final%20Benchmarking%20Report.pdf)
- European Commission. (2003) Observatory for European SMEs 2003: No.8 – *Highlights from the 2003 Survey. Luxembourg*: ENSR – KPMG – EIM, 52.
- Eurostat. (2002) Statistics in focus – Industry, Trade and Services: Enterprises in Europe – does size matter? Theme 4 – 3/2002, 7.
- Heeks, R. (2002) 'Information systems and developing countries: failure, success, and local improvisations', in *The informationsociety* (18), 101-112.
- OECD. (2002) *Measuring the non-observed economy: a handbook*. Paris: OECD – ILO – IMF – CISSTAT, 249.
- Pierson, J. (2005) Domestication at work in small businesses, in T. Berker & M. Hartmann & Y. Punie & K. Ward (Eds.) *Domestication of media and technology*. Berkshire: Open University Press, 205-226.
- Pierson, J. (2003) Identifying the digital divide on business-level: micro-enterprises and computers, in B. Cammaerts & L. Van Audenhove & G. Nulens & C. Pauwels (Eds.) *Beyond the digital divide: tackling exclusion and fostering inclusion*.